AVIATION

The Oldest American Aeronautical Magazine

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Seven U. S. Marine Corps' Curtiss "Falcons" in "V" formation.

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Special Features

The Cirrus Mark III
The Military Value of Airships
Use of Monel Metal and Nickel in Aircraft

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Slotted Wings

A NUMBER of De Havilland "Moths" and Avro "Avians" with slotted wings have been imported into this country, and in addition the Navy Department has equipped some of its planes with slots. The opinions expressed thus far, however, by those who have piloted the slotted wing planes, vary widely as to the actual value of the slot device.

The slotted wing has been under development for many years. The idea originated almost simultaneously in England and Germany, and a somewhat similar idea for slotted wings apparently was tried in the Argentine. The first slot devices extended the full length of the leading edge of the wing, and were manually operated. Later, a slot on the trailing edge was added. Wind tunnel tests, made with wings equipped with these slots, showed a great increase in the maximum angle of lift and a long postponement of the stalling point. However, the development of the slot device does not seem to have been pushed with much vigor, and, until the last year, comparatively few planes were built to include slots.

Last year, it was found that the device could be constructed so that it would operate automatically. This discovery eliminated one of the greatest handicaps. With the hand operated type it had been learned that when the pilot found himself in trouble, he would forget, or would be too busy to use the device. Thus, the slots were practically valueless when most needed. Some experiments have been conducted with a view to extending the automatic slots to cover the entire length of the wing. However, on the majority of the slotted wing planes, both here and abroad, the slots have been applied only to that portion of the leading edge in front of the ailerons.

The benefits derived from the use of slots are hard to appraise. The majority of pilots who have flown planes equipped with them admit the value of the slot device, and say that maneuvers may be performed with such planes, which cannot be performed with others. At the same time, they say that they would just as soon fly planes without slots. The statements sound, and are, contradictory. Especially to the more experienced pilots, a plane fitted with slots feels peculiar. This is especially true in stunting. Many pilots also argue, that even though the slotted wing plane can be better controlled beyond the stalling point, yet, if the added control is used, the plane becomes even more dangerous than one without the slot device.

When fitted to a plane with a thin wing section such as the R. A. F. 15, the slots seem to be of greater value than they are on a plane employing a thick wing section with a high lift and a delayed stalling point. Improvements in the balance of planes and their control at all angles of attack have been made much more rapidly, and have received greater attention than have wing slots. If the slot device is to be introduced successfully in this country, it will have to show considerably greater advantages than it does now. Both the theoretical aspect and the practical application will have to be developed greatly before the device is accepted readily by the manufacturers and operators of modern types of planes.

Local Aeronautical Exhibits

DETROIT, last spring, had the courage to stage an indoor aeronautical show. From the standpoint of the industry the show was considered well worth while, even though the direct sales did not cover nearly the expenses of the exhibitors. From the point of view of the organizers of the show, it was highly successful also, since the receipts considerably exceeded the expenditures. As a result, the professional show organizers all over the country decided that the time was ripe for making money out of aeronautical shows, and the members of the industry were bombarded by demands to place exhibits in the shows of innumerable towns and villages.

Good exhibits are an expensive form of "good will" advertising, as far as manufacturers of aeronautical products are concerned, and there was naturally a strong reaction to the pressure that was brought to bear. The industry, under the auspices of the Aeronautical Chamber of Commerce, met the situation by forming an exhibit company of its own, and almost all of the manufacturers, large and small, took shares. The time was propitious, and the first exhibition to be held by the industry, through its own organization, is soon to be staged in Chicago. Profits, if there are any, will revert to the industry, and that is as it should be.

In the meantime, it has been proved by Boston, Philadelphia and other cities, that local aeronautical shows can be both worthwhile and successful financially. National and local shows, however, should not be confused as to their nature. National shows are staged by the aeronautical manufacturers either directly, or with the assistance of the local distributors. Local shows are run by and for the local dealers and distributors of planes and accessories. The expense to the manufacturers is nil, and the expense to the dealers is comparatively slight, especially if the shows are held during the fall or winter when work has slacked off a considerable amount, and equipment can be spared for show purposes. The gate receipts from a properly advertised local show are considerable and, besides the good will created, there is a possibility of contacts and direct sales to persons who might not be reached otherwise.

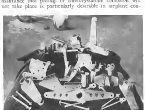
Whether the industry through the Chamber of Commerce should investigate and sanction these local shows is questionable, but it certainly should not discourage them as a matter of policy. It should be realized that local shows can do much good by gradually creating, wherever they are held, a greater sense of "air mindedness."

Use *of* Monel Metal *and* Nickel *in* Aircraft

By Robert J McKay and Robert Worthington
Development and Research Department, The International Nickel Co

In view of recent developments in the use of monel metal and nickel for parts of air craft, and to give designing engineers a brief review of the properties on which the use of these metals is based, these paragraphs have been written. Monel metal and nickel have certain valuable mechanical properties to which attention has not been sufficiently drawn in former publications Therefore, in this article rather more emphasis is put on these properties than would otherwise be the case

Monel metal consists of 69 per cent nickel, 28 per cent copper, 2 per cent iron, and 1 per cent manganese, silicon and carbon. Both monel metal and nickel combine strength and stiffness with inherent resistance to the forms of corrosion encountered by airplane parts. This last characteristic is the most significant—the means of protection used with steel and the light alloys are not needed in the case of monel metal and nickel and, even more important, the weakening of structural parts that accompanies even the slightest amount of corrosion is avoided They are not subject to the intercrystalline embrittlement characteristic of cold-worked brass and of the light alloys, or to the pitting frequently occuring with the ferrous metals and the light metals. The assurance that pitting or intercrystalline corrosion will not take place is particularly desirable in airplane construction where weight must be kept down and close figuring on mechanical properties is necessary The extent to which the strength of a metal part is lowered by pits is out of proportion to the actual decrease in section due to the pit; and in this fact lies the especial seriousness of it.



Nuts, bolts, control parts and fittings made of monel metal and used in airplane construction.

A view of one of the all-monel metal pontoons made by Brewster & Co, showing the internal construction This photograph was made before the hull covering was attached

On a purely mechanical basis the light alloys and the steels would satisfy the greater part of the requirements of the airplane industry It is due to the fact that these mechanical properties are often modified by chemical deterioration that consideration of the corrosion resisting metals, with more stable, though sometimes at first glance inferior mechanical properties, is necessary

Monel metal and nickel are being used in some degree at the present time in airplane construction One example is the use of exhaust manifolds by several prominent airplane manufacturers, a use dependent on the resistance of monel metal and nickel to progressive oxidation in the high temperature range Neither metal rusts, of course, and the oxide film that forms with heat effectively prevents further penetration The form of these manifolds has not been standardized, flexible hose and welded and riveted construction have been used.

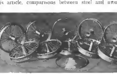
The salt-water resistance of monel metal and nickel is well known. The U S Navy has recently had built by Brewster & Co two all-monel metal pontoons, for use in tropical waters on Vought seaplanes These floats do not exceed the weight of analogous dural floats by 10 per cent, and of course require no protective surfacing Gasoline tanks, both of the pressure and gravity types, have proven successful No corrosion is experienced In Australia, monel metal wheels, including rims, spokes, and hubs, are used Monel metal strip has been successful as sheathing on the leading edge of wooden propellers, and "Monel-plymetl" is used on instrument boards Gasoline and oil lines and miscellaneous stamped fittings are very logical applications.

In galvanic contact with the light metals and steels,

One of the all-monel metal seaplane floats recently completed by Brewster & Co for the U S Navy

monel and nickel behave like copper, the brasses and the bronzes tending to accelerate corrosion of the light metals and steel In good electrolytes like seawater, the use of two metals in contact is very dangerous For parts in atmospheric exposure, also, the coupling of metals quite unlike in electrochemical behavior may be dangerous Rainwater and moisture condensing on metal surfaces carry sufficient dissolved salts to make them definite electrolytes Brass rivets, for instance, have been known to accelerate corrosion of dural sheet held by them in atmospheric exposures It is possible to protect with paints the joint between dissimilar metals from corrosion, where such a couple is necessary

The properties of steel are generally used as a standard in airplane as well as other construction In this article, comparisons between steel and monel and



Five sets of airplane wheels constructed entirely of monel metal, except for the internal rings which are of seamless nickel tubing

nickel are frequently made. The outstanding difference between steel and monel metal is the unqualifiedly greater resistance of monel to almost all forms of corrosion Therefore, among the uses where monel metal best fits are those where the lack of dependability of protective coats is serious

In some of the ordinary mechanical properties, the medium steels do not come up to monel, some of the highstrength alloy steels are better than monel In impact resistance (toughness), monel is distinctly better than the commercial steels Monel is a little over 10 per cent heavier per unit volume than the run of steels but an appreciable part of this difference is counteracted by the protective coatings necessary on steels E A Richardson[1] has stated recently that for steel 02 in thick the weight of finish on both sides required by Navy specifications adds nearly six per cent to the weight and that the corresponding increment for aluminum may be as much as 15 per cent

H C Knerr[2] in a recent paper has pointed out a valuable relation between various materials in respect to their tensile strength per unit weight We are reproducing his table and corresponding values for monel (from McAdam)

	T S	Dens	T S / Dens.x1,000
Music wire—0 01	401 000 psi	7.85	51
Alloy steel high	150 000	7 85	19
Duralumin	55,000	2 85	19
Magnesium alloy	34 000	1 75	19
Alloy steel—htd	100 000	7.85	12.7
Mild steel—norm	55,000	7.85	7 0
Aluminum—ann'd	12,000	2 7	4 4
Monel metal—ann'd	81 900 psi	8 8	9 3
Monel metal—hard	127,200	8 8	14 5

In addition to the relation given and, in the opinion of the writers, even more important than this are some parallel properties—weight relations for proportional limit endurance limit, corrosion-fatigue limit and impact strength The figures for mechanical properties given in the accompanying table have been drawn from the papers of D H McAdam[3] The relative value of these several property-weight relations is difficult to judge, in fact, this depends on the particular parts of airplanes for which the metal is to be used, and no one of them may be considered to the exclusion of the others

The endurance limit property is considered by the authors one of the most important In most cases, a given stress repeated a great number of times causes failure and it is this stress which an airplane should be built to withstand The endurance limits for monel metal are as follows.

Annealed— about 35,000 psi
Hot rolled—about 35,000
Cold-worked—35-50,000 (depending on the temper)

These are to be compared with a range of 14-18 000 psi for dural, varying with the temper Values for carbon steel are in the same range as those for monel and vary with heat treatment; for alloy steels somewhat higher

[1] *Richardson E A—A I M M E Tech Publ No 94 (1928)*
[2] *Knerr H C—Trans A S S T 13 (1927) 735*
[3] *McAdam D H—Trans A S S T 11 (1927) 355; Proc A S T M 27 II (1927) 102 Proc of International Congress for Testing Materials (1927) A I M M E Tech Publ No 58 (1924), Proc A S T M 28 (1928) preprint*

than those for monel Where the part is subject to fatigue stresses it is desirable to use the endurance limit rather than tensile strength, yield point, elastic limit or proportional limit in computing safe working stresses

McAdam's recent work on corrosion fatigue has at attracted much deserved attention It has been shown that a great many otherwise unexplained failures of metals are due to the combination of corrosion and fatigue which he has studied and measured quantitatively While there are still gaps to be filled, our knowledge of this property, thanks largely to Mr McAdam, is sufficient to make its measurement of great use in evaluating metals

The values for monel metal are

Fresh water	25,000 psi
Brackish seawater	28,000

The above corrosion fatigue limits for monel apply to both work-hardened and annealed metal From the standpoint of aeronautics, it is significant that its undesirable to have to cover the indefiniteness of safe working stresses by a large factor of safety, that due to vibration there is a constant application of alternating stresses, and that vibrating exposure considering that the metal surfaces are frequently covered with moisture, constitutes a virtual corrosion fatigue condition

Impact tests indicate that no common metal has higher impact resistance than monel and few consistently approach it Although a relationship usually exists between impact strength and tensile strength-ductility, this relationship differs numerically among different metals and among different heat and cold-work treatments Izod values for monel run consistently between 100 and 120 ft lb, usually around 120 The carbon steels run lower, and the high strength steels considerably lower, in the hardened condition The values for dural are around 15 and 20 ft lb The impact resistance of a metal, a

Three monel metal gasoline tanks for installation in aircraft

function of interparticle cohesion, particularly in the time relation (rate of particle adjustment to impact forces), is probably of much greater practical significance than generally realized Structural members of aircraft are continually subject to stresses of an impact nature and resistance to these is of great importance In the impact and weight relation monel stands at the top of the list

Strength

	Tensile str	*Yield point*	*Prop limit*
Cold drawn, annealed	65-75 000 psi	25-35,000 psi	
Hot-rolled or forged	85 90 000	35-50 000	32-48,000 psi
Cold-worked, max hard	127 000		82 000
Spring wire	110 140 000	100-130 000	
Cast	65-80 000	30-40 000	

These values for monel (the strength of nickel is of the same order as that of monel) represent the range of properties obtained for metal of the given history, and in the case of cold drawn metal, the average of several rod specimens that had undergone similar reduction in the cold Values lying within the range given above for annealed and cold-drawn apply to strip as well Strength is increased by cold-work, and not by heat-treatment as in the case of steel and dural The elastic limit for heat-treated dural is about 40 000 psi and for mild (24 per

Another view of one of the Navy's monel metal seaplane floats showing the construction Note the flanging of the frames and the lightening holes

cent carbon) steel about 50,000 psi As a basis for stress calculations the elastic limit and proportional limit are better to use than yield point and much better than tensile strength This is true because the relation between either tensile strength, or yield point, and either elastic limit, or proportional limit, is not a constant for all metals, or for a single metal of varying degrees of cold-work or heat-temper Really, the comparison of two metals on the basis of their ultimate tensile strength is seldom justified

In the relation between strength in either torsion or compression and tensile strength, the properties of monel and nickel are not unlike those of steel The breaking strength in torsion of hot-worked monel runs around 62 000 psi and the proportional limit in torsion around 25 000 psi The proportional limit in compression for monel ranges from 25,000 to 60 000 psi or higher depending on the heat and work-treatment

Ductility

	Elong in 2"	*Red Area*
Annealed	35 50%	60-70%
Hot rolled	35 45	40 65
Hard	15 25	
Cast	25 35	

These values apply to both monel and nickel Both metals are very ductile in the annealed, hot-rolled, forged and cast states The ductility of hard tempered monel is good for most purposes, it is possible to use, for instance thin gauge strip with high elastic limit for purposes without too difficult forming requirements Half-hard metal can be given mild drawing operations successfully and harder tempers may be stamped, blanked, etc, without danger of breaking Spring-wire has sufficient ductility to permit it to be bent around its own diameter without cracking

The modulus of elasticity for monel is 26 000,000 psi, for nickel 30-33 000 000 psi, for steel 30,000,000 psi, and for dural 10 000 000 psi Neither monel nor nickel, therefore, will differ widely from steel in elastic rigidity in the case of individual parts of similar wall thickness For parts of equal weight, however, the former are somewhat less rigid than steel and are considerably less rigid than dural In fact, it is the advantage the light-alloys have in rigidity by virtue of light weight, that is one of

their remarkable properties, as R S Archer[4] has recently pointed out Although the light metals in standard rolled shapes have this advantage over the heavier metals, there remains the very important practical fact that, by means of fabricated shapes, a "directional" rigidity is obtained with the metals of high inherent rigidity that may equal the rigidity of light-alloy construction of ordinary design Brewster & Co has constructed, with unusually intelligent conception and workmanship, all monel pontoons that are a step in this direction

In plastic stiffness (dent and scratch resistance), which is a function largely of the inherent elastic limit, monel and nickel have, like steel, an advantage over the light metals, although the weight differential is partially compensating in favor of the latter

The density of monel is usually figured as 8 80 and nickel 8 84 Compared with values of 7 85 for iron and 2 85 for dural, these appear high Density is always considered, however in conjunction with other properties One example, where the higher density of monel required no compensating property, was a tow cleat, for attachment on pontoons, made of lighter weight in monel than feasible with dural and of at least equal strength There are probably other illustrations of the same point

Hardness

	Shore	*Rockwell*
Dead soft	16 *and under*	60B *and under*
Soft	17-18	61-68B
Skin hard	19-20	69 73B
¼ hard	21-24	74-82B
½ hard	25-30	83-89B
¾ hard	31 35	90 93B
Hard	36-40	94-97B
Full hard	*over* 40	98B *and over*
Hot rolled	23	

[4]*Archer R S—S A E Jour 23 (1928) 156*

The hardness of nickel is slightly less than that of monel In the annealed condition, monel metal has a much greater hardness than annealed dural copper, or aluminum and considerably greater hardness than wrought iron, and this relationship remains roughly the same with increasing cold work Steel is somewhat harder than monel

Resistance to progressive oxidation at high temperatures is a property both monel metal and nickel possess This, together with the fact that both metals retain substantial strength at elevated temperatures, makes their use desirable at temperatures where steels deteriorate rather rapidly, and where the light metals are deficient in structural strength The airplane exhaust manifolds are examples of such use, when the plane is in operation the manifold is maintained at red-heat The values given indicate —

	room	*600° F*	*800° F*	*1,000° F*
Monel hot rolled	85 000 *psi*	82 000	78 000	60,000

the change in tensile strength at elevated temperatures The values for nickel are roughly similar It is well to understand that tensile strength values obtained in tests at elevated temperatures must be given a very broad interpretation, since tensile strength itself is not a sound basis for calculations in airplane work and since short-time tests do not take into consideration the susceptibility to "creep" Monel metal and nickel retain their strength in greater degree than carbon steels, most of the high strength alloy steels and any of the brasses and bronzes

The oxy acetylene torch-welding of monel metal and nickel is readily accomplished after some experience, and if the differences in the procedure followed with other metals are understood A flame close to neutral on the

(Continued on page 1642)

METAL	TREATMENT	DENS D	TENSILE STRENGTH Psi	−D*	PROPORTIONAL LIMIT Psi	−D*	CHARPY IMPACT Ft. lbs.	−D	ENDURANCE LIMIT Psi	−D*	CORROSION FATIGUE LIMIT FRESH WATER Psi	−D*	BRACKISH SEA WATER Psi	−D*
MONEL METAL	annealed	8 8	81 900	9 3	25 000	2.8			35 000	4.0	21 000-24 000	2 4-2.7	27 000-29 000	3.0-3 3
	partially hard		83 000	9 4	40 000	4 5	63	7.2						
	hard		127 200	14.5	82 000	9 3	51 4	5 8	50 000	5 7				
NICKEL	annealed	8.84	77 600	8.8	19 000	2 1			35 000	4 0	21 000-24 000	2 4-2 7	20 000-22 000	2 3-2.5
	hard		131 700	15	85,000	9 6	65 8	7 7	50,000	5 6				
COPPER	annealed	8 85	31 200	3 5			29 4	3 3	10 000	1.1				
	hard		46 500	5.2	9,200	1.0	18	2.0	17 000	1 9				
BRASS (70 30)	annealed	8.5	45 000	5.3			36.8	4 3						
	hard		73 200	8.6			14.2	1 7						
ALUMINUM	annealed	2 7	12 600	4 7					6 000	2 2	4 000-5 000	1 5-1.8	2 500-3,500	93-1 3
	hard		20 800	7 7	10,800	3 9	16 1	6.0	8 000	3 0				
DURALUMIN	annealed	2 85	33 400	11 7	15 100	5 3			14 000	4 9	7 000-9 000	2 45-3 15	6,000-8,000	2 1-2 8
	heat treated		69 100	24 3	36 800	13.0	10 1	3.5	18 000	6 3				
STEEL (0 16% CARBON)	water quenched & drawn at 900° F	7 85	65 700	8.3	37,200	4 7	54.7	7 0	35 000	4.5	20,000-23 000	2.5-2.9	6,000 9 000	76-1 1
STEEL (0 49% CARBON)	water-quenched & drawn at 1000° F	7.85	110 900	14	65,800	8 4	19 4	2.5	53 000	6.7	20 000	2 55		
CHROME VANADIUM STEEL	oil quenched & drawn at 1000° F	7.85	150 800	19	87 500	11	17 7	2 2	68 000	8 6	18 000-20 000	2 3-2.5		
NICKEL STEEL (3 7%)	water quenched & drawn at 1000° F	7 85	130,400	16.7	90 700	11.5	29	3 7						
CHROME NICKEL STEEL	water quenched & drawn at 1000° F	7 85	138 250	17 6	96 700	12 3	30 6	3 9						
CHROME MOLYBDENUM STEEL	oil quenched & drawn at 1000 °F	7 85	117 600	15	81 000	10.3	39 6	5.0						
CHROMIUM IRON 14 5% (HIGH CARBON)	oil quenched & drawn at 1200° F	7 7	117 400	15	41,200	5.2	13.4	1 7	54 000	7 0	36,000-38 000	4 6-4.8	25 000-30 000	3.2-3 8

A table showing the mechanical properties and strength-weight ratios for monel metal and nickel as compared with those of other metals The test values given are from McAdam Wherever an asterisk appears in the table it indicates that the values should be multiplied by 1/1000

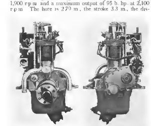
The Cirrus Mark III

Production of This Four Cylinder Vertical Air Cooled Engine is Soon to be Started in the United States

PRODUCTION in the United States of the Cirrus Mark III engine, now being used extensively abroad, is soon to be started by the American Cirrus Engine Co New York, N Y Manufacturing rights have been obtained by the American company from A D C. Aircraft, Ltd, London, and arrangements are being made for the shipment to the United States of several complete engines and of a complete set of parts, both in the rough and finished Tools and jigs also are to be shipped

Cirrus engines are now being produced in England at the rate of 20 a week and are being supplied to 25 different countries At least 25 of the Cirrus engines are now in use in the United States The Cirrus engine is particularly well adapted to installation in two passenger training planes, or in two and three passenger light commercial planes Application of this power plant to small twin engined and tri-engined planes is also an interesting possibility

The Cirrus Mark III is a four cylinder-in-line, vertical, air cooled engine, having a normal output of 85 b hp at 1,900 r p m and a maximum output of 95 b hp at 2,100 r p m The bore is 2 79 in, the stroke 3.3 in., the dis-

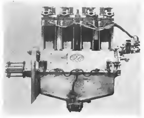


Front and rear views of the Cirrus Mark III Engine showing adaptability to efficient installation and cowling

placement 81 cu in, and the compression ratio is 5 4 to 1 The weight of the engine dry is 280 lb Its overall length is 29 5 in, overall height 23 3 in and overall width 12 25 in. Fuel consumption is 54 lb per b hp hr or approximately 7 65 gal. per hr, while the oil consumption is 0213 lb. per b hp hr

Cylinders and cylinder heads are separate The cylinders are constructed of cast iron and the heads of aluminum alloy with air-cooling fins cast on each The clinders are spigoted into the crankcase and into the heads The joints between the cylinder and heads being made by copper and asbestos gaskets The cylinder heads are easily removable without taking down the engine. The complete cylinder with head is secured to the crankcase by means of four studs projecting from the crankcase and passing through holes in the cylinder head

In the cylinder heads special bronze seats for the exhaust and inlet valves are screwed, and expanded into position The valve guides, which are a force fit in the



A side view of the Cirrus Mark III engine

heads, are of phosphor bronze Provision is made in each cylinder head for two spark plugs, two bronze screwed bushes being fitted

In the crown of each cylinder head, one inlet and one exhaust valve is fitted Both valves are operated by means of push rods in conjunction with the tappet rods located in the upper part of the crankcase. The tappets are actuated directly by the camshaft Rocker arms are carried on a separate steel bracket, which is bolted to the top of the cylinder heads

The pistons are aluminum alloy castings, the crowns of which are adequately reinforced on the underside by cross webs They are fitted with three piston rings of cast-iron The lowest of these rings also acts as a scraper ring, as a groove is turned in the piston immediately below it, and a number of small holes are drilled around this groove through which oil can escape into the inside of the piston This arrangement prevents any excess of oil on the cylinder walls from finding its way into the combustion chamber The hollow piston pin is of the full floating type

The connecting rods are made from duralumin forgings of "H" section The cap of the big end is secured to the rod by two bolts, and the big ends are fitted with die-cast

(*Continued on page* 1640)

The Military Value *of* Airships

By Capt F L M Boothby, R.N (Ret)

Fellow of the Royal Aeronautical Society

IT is a more or less current saying today, that "airships are of no military value." In the early days of the War, G H. Q, France and the War Office were of the opinion that armored cars and tanks were also of "no military value" Today, they are admittedly highly important weapons Similarly, with the lapse of a few more years, we may expect to see the airship take its proper place in the armament of the nation.

After the World War it was unfortunate that no officer with airship experience was appointed to the Air Council Even today, no such officer has ever served on that body The decision to abolish service airships was taken by men, who had no opportunity of understanding the harm they were doing, and the enormous amount of waste their decision would entail They sincerely believed that the plane could undertake all the commercial air work required in the British Empire, and that they could build up a large reserve of aircraft by a system of subsidies Today we see the result—20 commercial planes! It is no use crying over spilled milk Let us see what can be done to put the matter right, and to restore the airship to the position, from which it should never have been ousted

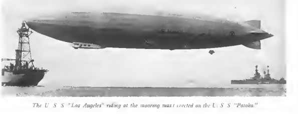
Were a Committee of Enquiry into the Defects of Airships in the past to be appointed, we might expect it to enumerate the defects much as follows and to suggest the accompanying remedies

(1) The airships employed by both the British and Germans were liable to destruction by incendiary bullets Cause The oxygen in the air and the hydrogen in the airship were separated from each other only by a layer of fabric of paper thickness, and immediately came together, when this layer was penetrated by a flaming projectile Remedy If a layer of inert gas is interposed, between the oxygen in the air and the hydrogen in the gas bags, any of the existing types of incendiary bullets can be fired into the airship without igniting it Such a supply of inert gas is present in the exhaust from the motors, which can be cleaned and cooled at a small expenditure of weight, and used for the purpose The objection to its use is that the gas is poisonous and precautions must be taken that it does not reach the living spaces If helium is available it can be used without the latter objection

(2) Airships were liable to damage by anti-aircraft fire supported by searchlights Cause Owing to the necessity of airships returning to their bases in fine weather, to allow of their being placed in their sheds, raids took place mainly in anti-cyclonic weather with clear skies, which was most suitable for the operation of guns and searchlights Had it been possible, raids would have been carried out in cyclonic weather with low lying clouds, which would have completely immobilized guns and searchlights As it was, the anti-aircraft fire was not a serious menace to airships Remedy Mooring masts can now be made available for all airships, allowing operations in any weather

(3) Rigid airships broke in the air One of these was the "Dixmude," a ship of the L 70 class The R 38 was a weaker imitation of the same class Cause: the L 70 class was designed for high flying For every 1,000

(*Continued on page* 1632)



The U S S "Los Angeles" riding at the mooring mast erected on the U. S. S "Patoka"

Announces International Air Conference Program

Plane-Rail Transportation to Chicago Exposition Planned for Foreign Delegates

WASHINGTON, D C—Details of the program for the International Civil Aeronautics Conference to be held in Washington, December 12, are announced by Leighton W. Rogers, executive officer. They embrace plans for meeting the foreign delegates on shipboard, transporting them by rail and plane to the International Aeronautics Exposition at Chicago, returning via the air to Washington, and after the Conference journeying to Kitty Hawk, N. C., to celebrate the 25th anniversary of power flight at the site of the Wright Brothers' early experiments. The landing at New York and other ports of entry of the delegates who are coming from many countries engaging in commercial aeronautics will be facilitated through the customs by Conference representatives. At New York, an office of the Reception Committee will be opened November 26 in the Hotel Roosevelt.

Weather permitting, it is planned to provide free airplane transportation for Conference delegates and representatives from Cleveland to Chicago, and, on the return, from Chicago to Dayton. Uncertain weather conditions over the mountains at this time of year led to the change in plans to carry the delegation all the way from New York by air.

Special Train from New York

A special train will leave New York at 6 30 P M Thursday, December 5 from the Pennsylvania Station. Arriving at 8 50 o'clock the next morning, the party will be guests of the Cleveland Chamber of Commerce and the National Air Transport, Inc., before departing shortly after noon by plane for Chicago. The fleet of multi-engined airplanes for the Chicago trip will be gathered at the Cleveland airport. In case of unfavorable flying weather, the trip will be continued by train.

The Chicago exposition has designated Friday, December 7, as the day for special entertainment of Conference delegates. Nearly every type of American aircraft both commercial and military and engines, accessories, etc., will be viewed at the exposition, which will show the most recent developments and progress in commercial aeronautics. There will also be European aircraft sent by manufacturers for exhibition.

Banquet at the Sherman

Entertainment throughout the day at Chicago will wind up with a banquet by the City of Chicago at the Sherman Hotel. The Conference airplanes will leave for Dayton, O., Saturday, December 8, or Sunday, December 9 weather permitting. If the weather prevents, a train will leave Sunday evening.

Dayton, home city of the Wright Brothers and scene of their first experiments is celebrating the 25th anniversary of the first successful flight in a power-driven craft, made by Orville Wright at Kitty Hawk, Dec. 17, 1903. The city and the Chamber of Commerce will entertain the visitors, meeting them at the airport or railroad station and providing accommodations.

An opportunity will be provided for visits to the experimental laboratories of the Army Air Service, and in the evening a dinner and celebration for the Wright Brothers given by the City of Dayton will be attended by the visiting delegation. The special train to Washington is scheduled to arrive there about 1 30 P M Tuesday, December 11.

Registering and depositing their credentials the same afternoon at the Conference headquarters in the United States Chamber of Commerce building the members of the Conference will participate in the following program:

Tuesday, December 11—10 A M to 6 P M Registration and deposit of credentials at Conference headquarters in Washington. *Wednesday, December 12*—10 A M Opening plenary session of the Conference 12 30 P M to 2 00 P M luncheon 2 30 P M to 4 15 P M—sub-sessions of the Conference 5 00 P M, delegates received by the President at the White House 9 00 P M, reception by the Secretary of Commerce, at the United States Chamber of Commerce Building.

Plenary Session Thursday

Thursday December 13—10 A M, plenary session of the Conference 12 30 P M to 2 00 P M luncheon 2 30 P M to 4 30 P M sub-sessions of the Conference 8 30 P M "Twenty five Years of Flight" Washington Auditorium. *Friday, December 14*—10 A M plenary session of the Conference 12 30 P M to 2 00 P M luncheon 2 30 P M to 4 30 P M sub-sessions of the Conference 8 00 P M banquet to members of the Conference by American delegation. *Saturday December 15*—10 30 A M Aerial Show at Bolling Field and Anacostia Naval Air Station by United States Army, Navy and Marine Air Services 12 30 P M to 2 00 P M luncheon 2 45 P M, inspection of laboratories at United States Department of Commerce Bureau of Standards 6 30 P M, departure of delegation for exercises at Kitty Hawk, North Carolina, in commemoration of the twenty fifth anniversary of the Wright Brothers first flight. *Monday December 17*—1 P M to 2 00 P M, ceremonies at Kitty Hawk, North Carolina 3 00 P M, departure from Kitty Hawk on return trip to Washington. *Tuesday December 18*—7 00 A M, arrival in Washington, disbandment. The delegation of foreign and American members of the Conference will leave Washington by steamer at 6 30 P M Saturday December 15 proceeding down Chesapeake Bay to Old Point Comfort near Norfolk Va. They will arrive at 7 A M Sunday December 16 and will spend that morning at the Chamberlain Vanderbilt Hotel and visiting the Langley Memorial Aeronautical Laboratories.

On Monday morning December 17, the party will be conveyed by boat and bus to Kitty Hawk North Carolina where the delegation will be guests at a luncheon of the Kill Devil Hills Memorial Association.

Monday, December 17, is the date of the 25th anniversary of the first flight. At Kill Devil Hills, scene of this flight, a cornerstone will be laid for a monument to be erected by the United States government. On the spot from which the first flight was made a memorial is being placed by the National Aeronautic Association. The delegation will participate in both unveiling ceremonies.

The party will leave Kitty Hawk at 2 P M Monday, arriving in Washington early on Tuesday, December 18.

Joint Promotion Tried at Boston

BOSTON, Mass.—Boston airplane operators recently united their forces for the first time in a public advertising project to secure passengers to fly to the Yale-Princeton and Yale-Harvard games. Boston Airport Corp, Skyways, Inc, Old Colony Airways, and Dennison Airport Corp had been attempting to book passengers independently. By publishing a combined advertisement in which each company paid according to the number of planes it had available for the game trips, a front page advertisement calling attention to a large advertisement on the sporting pages was published in the Boston Evening Transcript for several days.

Form Universal Flying Schools at Minneapolis

MINNEAPOLIS, MINN—Formation of Universal Flying Schools with Willis J. Haviland of this city as its head was announced here recently by L. H. Piper, president of the Universal Aviation Corp, the parent organization.

The new company will take over all flying schools recently acquired in the merger of several airplane lines under the Universal Aviation Corp. These include Mid-Plane Sales & Transit Co of Minneapolis, Egyptian Airways school at Marion, Ill. and the Robertson School of Aviation at St Louis. In addition, schools are being started immediately at Chicago and Cleveland, with others scheduled to be organized in the near future.

Immediate improvement of facilities at all schools will proceed at once. A $25,000 building is now being erected at Wold Chamberlain Field here as part of the local flying school equipment.

Patrician Attains 151.3 M.P.H.

BRISTOL, PA—A speed of 151 3 m p h is said to have been attained by the Patrician, Keystone's new 18 passenger plane in recent tests over a measured course here.

Champion Salesmen Convene

TOLEDO O—More than 150 Champion Spark Plug salesmen convened November 19-23 at the company factory here.

Easterners Buy Into Travel Air

Contract Let for New Factory With Double Capacity Of Present Plant

WICHITA KAN—Following reception here of the announcement from New York that Hayden Stone and Co has assumed a 50 per cent ownership in Travel Air word was given out locally that a contract had been let for a new factory that would have approximately twice the capacity of all present Travel Air equipment, to be built on Travel Air field. The company also plans to purchase the present airport, on which it is located, as soon as the city takes possession of its new 640 acre airport.

Officers of the new company will be the same as at present, the only change being that four representatives of eastern capitalists will sit on the board of directors with the five Travel Air members already chosen. Walter Beech president, has announced that there will be no change in the management and conduct of the organization.

Organized in 1925

Travel Air was formed in Wichita in January 1925 by Walter Innes, Lloyd Stearman and Clyde V Cessna. Since then Stearman and Cessna have each formed their own companies each located in Wichita, and Innes is with Stearman. Present officers, in addition to President Beech are Thad C Carver, Pratt, Kan, first vice president, J H Turner, Wichita, second vice president, W R Snook, Wichita, secretary, and C. G Yankey Wichita, treasurer.

First production of the Travel Air factory was centered on a light three place plane and a heavy duty five passenger plane. In December of 1926 the company moved to its present site on the airport and last year completed a second factory unit.

Slate Dirigible Nearly Ready

LOS ANGELES CALIF—All machinery has been installed in the Slate experimental all-metal dirigible, the bag is being filled with hydrogen and it is hoped to attempt the test flights of this craft soon according to Capt. Thomas Slate designer. The dirigible is 212 ft long, and is to carry 40 passengers with a crew of five.

Boyle Builds "Oriole"

BALTIMORE, MD—A two seater dual control monoplane, the "Oriole," has been built in Baltimore by the Boyle Aircraft Corp. It is equipped with a 60 hp air cooled engine, and is said to be capable of 100 m p h.

Engine Export Figures Given

WASHINGTON, D C.—Aircraft engine export figures for August 1926 are announced by the Bureau of Foreign and Domestic Commerce. Thirty-four engines with a total value of $114 355 were sold as follows: Germany, seven engines, worth $38 071; Canada, 13, worth $62,399, Mexico, three, $345; Brazil, six, $4100; Hong Kong, four, $980, and Japan, one, $8,500.

Pioneers of Aviation Form "Early Birds"

WASHINGTON, D C—The "Early Birds," an association of pioneer airmen, has been instituted by P. S B Morriss of New York and Ernest Jones of Washington and will hold its first annual meeting at Chicago, December 3 during the air show at that city.

More than 200 are estimated to be eligible for membership. Among those who have already signified interest in the organization are: Brig Gen Benjamin D Foulois, assistant chief of the Army Air Corps, Capt. George A Gray, local representative of Pioneer Instrument Co, Maj Ernest Jones of the Commerce Department, Maj. Thomas DeW. Milling, Office Chief of Air Corps; Miss Marjorie Stinson, sister of Eddie, Capt Holden C Richardson, Materiel Division, Bureau of Aeronautics, Comdr John H Towers, of the Navy, Clyde V Cessna, Parker D Cramer, Glenn H Curtiss, Chas H Day, Ivan R Gates, B. R. J Hassell E M Laird, Earle Ovington, Augustus Post, B Russell Shaw, Walter J Shaffer, and Igor Sikorsky.

Issues Insurance Query

NEW YORK, N Y—A special questionnaire for those insurance applicants contemplating taking numerous airplane flights has been issued by the New York Life Insurance Co. The questionnaire is intended to elicit information regarding the number of flights planned, the period during which they are to be made, the type and passenger capacity of the plane, the type of license held by the pilot, the applicant's intentions, if any, of becoming a pilot, etc.

Hornets Power Hamiltons

MINNEAPOLIS, MINN—The new Hamilton all-metal monoplanes now in service on the Universal Air Lines passenger run between the Twin Cities and Chicago are equipped with Pratt & Whitney 500 hp Hornet engines. These power plants give them a cruising speed of 125 m.p.h.

To Build Savoia Airplanes Here

Mussolini Gives Permission for U. S Production of Italian Craft

NEW YORK, N Y—Savoia Marchetti, internationally known design of flying boat and amphibian plane to which Italy is greatly indebted for her aeronautic reputation, will be manufactured in the United States, according to an announcement here that Premier Mussolini has given his consent to a contract whereby the American Aeronautical Corp, a recently chartered organization with offices in the Hecksher Building, becomes the holding party and will be in charge of production.

The contract, work upon which was started nearly a year ago, was effected largely through the efforts of Anea Bossi, pioneer Italian aviator who has become an American citizen.

To Use Wright Engines

The Savoia-Marchetti planes will be powered with Wright engines. The contract provides that one of the largest flying boats ever built, carrying 24 passengers in addition to its crew of three will be produced here. It is planned to bring six of the Italian made planes over for exhibition purposes and one of the 24 passenger craft will probably be sent on a tour of the country. This plane is of twin hull construction and is powered by four engines. Among the craft to be imported are two amphibian and two six passenger flying boats.

The board of directors will be announced within the coming week, Mr Bossi said, and will include men prominent on Wall Street. Several factory sites on the north shore of Long Island are being considered with a view of starting production as soon as possible.

Insurance Firms Use Air Mail

NEW YORK N Y—Use of the air mail to reduce the time factor in the insurance business has been adopted by a number of companies, according to W L. Crocker president of the John Hancock Mutual Life Insurance Co. Not only does the air mail expedite the settlement of claims but it is used for the transmission of applications and policies.

Plan European Aero Survey

FARMINGDALE, L I, N Y.—Harold Caminez and David B Caminez will leave for Europe the last week in November to make a survey of the aviation industry abroad.

Fairchild to Sell New Monoplanes

Company Will Announce Sliding Dealer Discount Sale at Show

FARMINGDALE, L. I.—Two four and seven passenger monoplanes will be offered by the Fairchild Aviation Corp in 1929, according to reports at the plant here, with a sliding scale of dealer discounts enabling a selling plan favoring the plane agent. Prices of the new planes which will be displayed at the Chicago show, will be announced at a dealers' dinner at the Stevens Hotel December 5.

The Fairchild "21" is a two place open-cockpit training plane with a top speed of 105 m.p.h., a cruising speed of 90 m.p.h., and a landing speed of 40 m.p.h. It is powered with an 80 hp Genet engine and is reasonably priced. The plane provides an excellent range of vision from both cockpits which are close together for ease of communication between the two passengers. The landing gear has been moved considerably forward of the center of gravity. It has an 8 ft tread and a tail wheel has been substituted in place of the conventional tail skid.

Whirlwind Powers "41"

The Fairchild "41" is a four place cabin plane, finished after the manner of fine automobile interiors. It is powered with the Whirlwind engine and has a top speed of 130 m.p.h., a cruising speed of 108 m.p.h., and a landing speed of 49 m.p.h. The chief features of the design are the folding wings, comfort of the cabin, etc.

The Fairchild "71" is a seven place cabin job, designed for transport work. Powered with a Pratt and Whitney Wasp, it has a high speed of 138 m.p.h. and carries a useful load of 2,700 lb. The outstanding features of the design are the folding wings, the spacious cabin and the ready attachment of seaplane, ski or photographic equipment, which make it available for an extraordinary diversity of services. Within the last year Fairchild 71's have flown over 1,250,000 mi.

Whittle to Handle Navy Airship Building Detail

AKRON, O.—Lieut. George V. Whittle has been sent to Akron as the first representative of the U. S. naval bureau of aeronautics who will handle details incident to construction work on the two new dirigibles which the Goodyear-Zeppelin Corp will build at Fulton Field, Akron Municipal Airport.

Lieutenant Whittle does not come to Akron as a stranger. He was detailed here several years ago as inspector of naval aircraft. Since April 1923 he has been on duty at the Lakehurst station.

Siren Operates Flood Lights

PITTSBURGH, PA.—The possibility of pilots turning on airport floodlights from their planes was illustrated at Bettis Field here when Westinghouse engineers threw a ground switch by means of sound waves emitted from a siren on their plane. The siren is operated by a wind motor. The sound waves are picked up on the ground by an electrical "ear," through use of an apparatus that is effected by these waves the pilot is enabled to switch the lights on and off at will.

Robertson Announces Changes in Personnel

ST LOUIS, MO.—Several promotions and additions to its personnel is announced by the Robertson Aircraft Corp here.

Harlan A. "Bud" Gurney has been appointed operations manager for the corporation. Gurney, who has been with the Robertsons for five years, was chief air mail pilot before his promotion.

Bert Ison, pilot of a tri engined plane in the St. Louis-Chicago passenger service, a flier for 13 yr., has been named chief flying instructor in the Robertson Flying School, which is affiliated with the Robertson Aircraft Corp.

R. D. Newton, formerly with Nicholas Beazley, is now an instructor in the Robertson school. Newton has more than 2,000 hr to his credit. He conducted a flying circus in Missouri, Kansas, Oklahoma, and Arkansas last year.

Sales are Announced Of Seven Eaglerocks

COLORADO SPRINGS, COLO.—An Eaglerock with Hisso "A" was shipped last week from the Alexander factory to Owen Meals, Alaska distributor of the ships at Valdez. It is his second Eaglerock and will be used in his passenger sightseeing and airmail service.

At Oklahoma City, Okla., two OX-5 Eaglerocks have been ordered by Cloyd P. Clevenger, author of *Modern Flight*, and Robert Garland, Tulsa oil man as a starter for the flying school they have launched here.

At Colorado Springs, a carload of four Eaglerocks with Hisso "A" engines was shipped last week to Mt. Vernon Airways, Eaglerock distributor at Alexandria, Va. J. W. Robertson, head of the company declared the planes were already sold.

Honolulu Fliers Get Trophy

WASHINGTON, D. C.—Lieutenant Lester J. Maitland and Albert F. Hegenberger of the Army Air Corps who made the non-stop flight from California to Honolulu in June 1927 have been chosen to receive the Clarence H. Mackay trophy for the most meritous flight by Army officers during that year, it is announced by F. Trubee Davison, Assistant Secretary of War.

Detroit Company To Plan Airports

Showalter-Associations Arranges Designing Service for Eight States

DETROIT, MICH.—Organization of Showalter-Associates, airport planners headed by Capt. Lloyd Showalter, World War pilot, was recently announced here. The firm, for the time being, will confine its interest to the states of Michigan, New York, New Jersey, Pennsylvania, Ohio, Indiana, Illinois, and Iowa, it was said.

Captain Showalter is a member of the U. S. Army Air Corps Reserve. Since the War he has been engaged in commercial aviation as an aircraft and airport operator in the East and Middle West. During the past four years he has made a study of airport development problems.

Showalter's associates, Ralph F. Pinner and Raymond H. Wilcox, of Pinner and Wilcox landscape engineers, J. Ivan Dise, architect, and John H. Schumann, electrical engineer, are all experienced in lines allied with airport development.

Fairchild Monoplanes Ordered by Interstate

CHICAGO, ILL.—Interstate Airlines Inc. announce that it has ordered a fleet of Fairchild six passenger cabin monoplanes equipped with Wasp engines for use on the Chicago-Atlanta service which it is inaugurating.

On the initially opened Chicago-Evansville section, the passenger fares from Chicago will be $15.00 to Champaign, Ill., $23.00 to Terre Haute, Ind., and $36.00 to Evansville, Ind. When the line is extended the fares will be $48.00 to Nashville, Tenn., $55.00 to Chattanooga, Tenn., $65.00 to Atlanta, Ga., $45.00 to St. Louis, Mo., and $40.00 to Louisville, Ky.

The fares include transportation between business district and local airport. The taxi air service planned at the various cities will be able to provide special flights for individuals and parties.

An Omission

Through omission of a printed line, a boxed article in our October 13 issue headed "Air Lines Had Least Fatalities" incorrectly stated that 240 persons lost their lives in aviation accidents during the period January June 1928. Addition of the omitted line corrects the sentence to read, "In this half year 390 *accidents were reported in which* 153 persons lost their lives . . ."

Three Services Plan a Merger

Goose Airlines, Interstate Line, and Scenic Firm, Announce Combine

CHICAGO, ILL.—Triple merger plans of the Gray Goose Air Lines, the Interstate Air Lines of Chicago and Scenic Airways Inc. of Phoenix, Ariz., to be operated under a holding company known as the United Aviation Corp, is announced by Lawrence W. Scudder, head of the Interstate and United companies. The controlling company will be incorporated for $20,000,000.

The Interstate company began scheduled operations on November 10 as a passenger, freight and mail line, the Gray Goose Lines is operating sightseeing planes and the Scenic Airways, Inc. of Phoenix is functioning on a charter which allows a service covering the beauty spots of the Grand Canyon and Arizona.

The new organization plans to engage in every branch of the aeronautical business, including the sale of oil, gas, mechanical parts, repairs and sightseeing service and aviation schools.

Mr. C. T. Blackburn, vice president and general manager of the Interstate company, announced that in addition to the triple merger other companies might join the consolidation and a definite report on these would be made later.

Form New Company To Make Fuel Tanks

LONG ISLAND CITY, N. Y.—Newly formed to manufacture aluminum fuel and oil tanks, the Streloff-Naughton Corp, 50 William Street, announces it is prepared to build all-aluminum parts for planes according to specifications. Nicholas Streloff, president of the firm, has been engaged in the making of aluminum welded tanks for 14 yr.

The company's plant occupies 7,500 sq ft of floor space. It is fully equipped with new machinery, and the firm states it is amply financed to care for any size job. Mr. Streloff personally supervises the work.

It is the plan of the Streloff Naughton Corp to cater to manufacturers of all types of airplanes. Prices, it is announced, will be offered on a moderate level.

Brinsmead to Visit Show

NEW YORK, N. Y.—According to a cable received by the Aeronautical Chamber of Commerce, Colonel Brinsmead, director of civil aviation for the Commonwealth of Australia, will visit the Chicago exposition and attend the International conference in Washington.

Schools Select Weems System

LOS ANGELES, CALIF.—Two aeronautical schools of the Pacific Coast, the Pacific Technical University of San Diego, Calif., and the Warren School of Aeronautics, Los Angeles, Calif., announce that they have been licensed to instruct the Weems system of avigation.

The method, invented by Lieut. Comdr. P. V. H. Weems, U. S. N., is said to be readily mastered by the beginner, and its proponents claim that the system makes it possible to work out the location of a plane or ship within 30 sec. after taking observations.

Boston Aero-Marine To Build Large Plane

QUINCY, MASS.—A five year lease of the Squantum Naval Aviation Base at this city has been taken by the Boston Aero Marine Manufacturing Corp, which plans to build new types of all-metal aircraft and all metal water gliders at the plant. Arman DeMuth, inventor, a director of the company, has made the announcement.

The Victory Terminal Corp., the Boston Chamber of Commerce and the Iver Johnson Co., maker of sporting goods, revolvers, rifles, etc., are interested in the new corporation. At this plant will be developed a new plane with six engines which is expected to be capable of making extraordinary speeds with a 40 passenger capacity with a cruising radius of 1,000 mi. These planes, according to Mr. DeMuth, will carry two pilots and a radio operator and a cook and a steward for long passenger trips.

Plan Fokker Factory At Los Angeles, Calif.

LOS ANGELES, CALIF.—Following announcement from New York that Pacific Coast interests had acquired control of the Fokker Aircraft Corp., the announcement has been made in Los Angeles that construction is to begin at an early date on a factory for building Fokker airplanes in Southern California. It is said that a total of $8,000,000 will probably be invested in the Los Angeles Fokker factory within the next year or so.

Plans for the expansion of Western Air Express transport lines, affiliated with the new Fokker organization, are said to contemplate the early inauguration of passenger service east from Los Angeles to a point on the Missouri river, using F-10 Fokker cabin planes.

Turns 283 Barrel Rolls

RACINE, WIS.—Ed Hedeen, transport pilot, recently turned 283 consecutive barrel rolls here, thus breaking the record of 80 established by Thunder Johnson, St. Paul flier. Hedeen flew a stock Waco.

Named to Direct New York Show

Anderson and Parsons Appointed to Manage Legion Exposition

NEW YORK, N. Y.—Ranks of the American municipalities holding aeronautical expositions will be joined by New York City when the New York Aviation Show opens here in the early part of February. Anderson and Parsons, Inc., has been appointed to take direct charge of the event which will be held at the Grand Central Palace February 6-13 inclusive and will be the first air exposition to be conducted in the metropolis since 1921.

The New York Aviation Show had its inception some months ago when Aviators' Post No. 743, American Legion, decided to sponsor and conduct a comprehensive and representative display of the latest types of aircraft, engines and accessories in order to bring the millions of people in the largest of our cities to the realization of the great advance which aviation has made in recent years.

A number of official bodies have been invited to cooperate with Aviators' Post No. 743 for the success of the New York Aviation Show. Among these official bodies are the United States Post Office Department, the Department of Commerce, the Pan American Union, the War and Navy Departments and the United States Weather Bureau. The various branches of the municipal government of the City of New York have also been asked to cooperate and to participate in the exposition.

Displays in Three Classifications

The various exhibits at the Grand Central Palace will be divided into three main classifications: general aircraft displays, including planes and balloons; accessories with airport equipment; educational and historical material and data.

Committees have been formed to take charge of the various activities coincident with the Show. These committees include the Honorary International Committee, the Pan American Committee, which includes many of the dignitaries of the 20 Pan-American nations, The National Committee, The General Publicity Committee, including aviation and radio editors.

Lady Heath Insures Plane

NEW YORK, N. Y.—Complete insurance protection will be carried on the Moth plane in which Lady Heath, holder of the world's altitude record for light planes, will tour the United States. The flight has been underwritten by Barber & Baldwin, Inc., aviation underwriter of this city.

Trade Tips

It Has Been Reported That—

—A fifth hangar is to be built at the Oakland Municipal Airport, according to the Board of Port Commissioners, and contracts for its construction will shortly be let. To cost approximately $75 000, the new structure will be 120 by 200 ft. in dimensions

—There is a noticeable impetus in the number of inquiries which have been made at the office of the Department of Foreign and Domestic Commerce in Wellington, New Zealand, for catalogues, prices, agency propositions, etc, regarding American aircraft.

—Plans for the first hangar at the Cincinnati Municipal Airport have been approved by C. O Sherrill, city manager and bids are to be asked as soon as possible The structure is to be of brick and terra cotta with the dimensions 114 ft by 112 ft and 27 ft high.

—The Watkins Manufacturing Co of Wichita, of which F A Watkins is president, is planning the construction of an airplane factory building near the municipal airport at St Paul, Minn

—Erection of a 60 by 65 ft hangar at Pocatello, Idaho, is announced by the Eastern Idaho Air Service, Inc. A shop and office building will be constructed adjoining the hangar, it is announced

—Lake Airways, Inc, headed by H W Hughson of San Francisco, has been granted a 10 yr. lease by Lakeport, Calif., to develop a modern airport, including administration building and hangar, the structures to cost about $30 000

Vibrating Reeds Guide Pilot on True Course

WASHINGTON, D C—A vibrating reed device which is sensitive to the signals sent out by radio beacons has been developed to indicate the true course for pilots flying in fog or above the clouds.

The instrument consists of two white-tipped vibrating reeds mounted on the instrument board of a shock proof case. The reeds are attached to electro magnets which are connected to the plane's radio set in place of the regular headset Upon reception of a radio signal these reeds vibrate, and if the vertical lines produced by their white tips are equal in length the pilot knows he is on the course.

Owing to the mechanical tuning of the reeds they are extremely free from the effects of all kinds of interference unless the interference is enough to block the tubes in the receiving set. The design of several types of reed indicator that is described in *Research Paper No. 28* of the Bureau of Standards, just published

Fliers Scatter Food for Birds

LOS ANGELES, CALIF.—Army fliers from March Field, Calif, have scattered tons of grain over the hills of Hemet Valley in order to prevent thousands of game birds from starving due to lack of vegetation caused by widespread brush fires in that region, it is reported by the Izaak Walton League of America

Several tons of grain were provided by the league members and the Army pilots have been making regular flights for this purpose over the devastated hills

Build Aero Engines At Indianapolis, Ind.

INDIANAPOLIS, IND—Development of a new airplane engine, designed especially for commercial aircraft, has been announced by Louis Chevrolet, head of the Chevrolet Aircraft Corp, 141 West 10th St This engine has been designed by Mr Chevrolet and is being built under his supervision at the plant of the Merz Engineering Co It is vertical, four cylinder, in line, air-cooled type, developing 80 hp and weighing less than 300 lb The first engine is expected to be completed before March 1, and its production in Indianapolis will depend on further developments and tests

The Chevrolet Aircraft Corp was incorporated by Louis Chevrolet last May, his son Charles is associated with the company Louis Chevrolet is also now on the technical staff of the Stutz Motor Co.

The Merz Engineering Co. also announces it has just completed an eight cylinder aviation engine to develop 50 hp at 2,000 rpm, from the design of Lee Oldfield of Chicago Satisfactory operation has already been accomplished

Field Day at Selfridge

DETROIT, MICH—Approximately 50 pilots of the Reserve Officers Association of Michigan recently held a field day at Selfridge Field. Capt. M A. Sine, head of the organization's air corps chapter, was in charge Col Charles H Danforth, commanding officer of Selfridge Field, and Col Frederick Knutsen, chief of staff 85th Division, were guests at the exhibition

To Give Away Show Eaglerock

COLORADO SPRINGS, COLO—An Eaglerock with Hisso "A" engine to be exhibited at the International Aircraft Show at Chicago was bought last week by the Chicago Post of the American Legion It will be given away at an aviation dance sponsored by the Post during the show Jack Oates, Northern Illinois distributor of Eaglerocks, made the sale

Organizations Make Personnel Changes

Several additions and changes in the personnel of various organizations have recently been noted They are as follows.

COL. EDWARD A. DEEDS of Dayton, O, a director of the Pratt & Whitney Aircraft Co, has been elected to a directorship in the National City Bank of New York City.

JACK L. ROLLINS has succeeded Charles Lukes as district manager for Aviation Service and Transport, Inc, Louisville, Ky. Mr Rollins is a pilot

RICHARD KNOX and HAROLD PRESTON, pilots, have been added to the personnel of Capitol Airways, Inc, which operates Indianapolis-Louisville and Indianapolis-Detroit service The two fliers were formerly with the Indiana Ohio Aero Corp. at Fort Wayne, Ind

LIEUT. WILLIAM F. RITTER has been named president of the Peoria Aero Club, Peoria, Ill, succeeding Louis Davis, Jr. Other officers elected are OSCAR HORBE, vice president, RUSSELL MILLER, secretary-treasurer; and CHARLES SCHWENK, assistant secretary-treasurer

GOODRICH K MURPHY, formerly district manager at Hartford, Conn, for Colonial Air Transport, Inc., has been named traffic manager of Colonial Western Airways, Inc, stationed at Buffalo, N Y JOHN F WHEELOCK will succeed Murphy at the Hartford post, it is announced

FRANK ARMSTRONG former manager of the St Paul office of the Universal Air Lines, has been transferred to the Minneapolis office as assistant sales manager of Mid-Plane Sales & Transit Co He is succeeded in St Paul by FLOYD HOCKRIDGE.

Open Rockford School

ROCKFORD, ILL—The Air Taxi Co. here recently opened the Rockford Aviation School at 100 West Jefferson Street. Jerry Martin is president of the company, while G A. Anders is secretary and treasurer

Miss Evelyn Nicholas of Lincoln, Neb, has been engaged to teach girl students Mr Martin announces Miss Nicholas will begin her work after the first of the year

Consolidateds for Buhl

NEW YORK, N Y—Consolidated instruments—tachometer, altimeter, oil pressure gauge, and oil temperature gauge—are announced as standard equipment on the Buhl Special Airsedan These products are made by Consolidated Instrument Company of America, Inc, this city

Inspects Railway by Plane

DETROIT, MICH—Charles B Sudborough, vice president of the Pennsylvania Railroad, has completed an air inspection trip of the railway's properties LeRoy Manning, chief of operations of Ford airplanes, piloted the Ford plane used.

AIRPORTS AND AIRLINES

Cessna Plane Catches Business Man's Train

ST LOUIS, MO—An incident showing the advantage and speed of the airplane to the business man took place on November 1 when Howard K Richmond of New York City missed the Pennsylvania train which leaves St Louis for New York at noon and chartered a plane from the Robertson Aircraft Corp to overtake the train An important business meeting which required Mr Richmond to be in New York the next day necessitated his taking the plane

A Cessna plane, piloted by Bud Gurney was used for the flight Richmond left the airport here 1 hr., 45 min. after the train had departed The plane reached Terre Haute, Ind., some 1 hr., 30 min. later before the train was due Better time was made than was expected, for plans were to beat the train to Indianapolis rather than Terre Haute Gurney was back on Lambert Field before dark

Los Angeles Airport Made Point of Entry

LOS ANGELES CALIF—According to announcement of the United States Treasury Department, Los Angeles has been listed as an official point of entry into this country of foreign aircraft This means that planes may now cross the Mexican Border and proceed without landing, to any airport within the city limits of Los Angeles for inspection by custom officials.

Owing to the difficulty of obtaining customs inspectors for the many fields in the Los Angeles district, Cliff Henderson director of municipal airports for the City of Los Angeles has asked the Secretary of the Treasury to name Mines Field as the only official port of clearance and entry for aircraft

Baltimore Buys Municipal Tract

BALTIMORE, MD — Five waterfront tracts, comprising approximately 120 acres have been purchased by Baltimore for the proposed municipal airport at a cost of $584,000 River banks are included, promising facilities for seaplanes

Several more tracts within the city are to be purchased shortly. The contract for bulkheading, involving 6,000 000 cu. ft. of earth for fill-in, is to be let within six weeks

St. Louis and Kansas City Bond Issues Are Nullified

But Supreme Court Ruling is Based on Technical Point With Purpose Believed Valid

JEFFERSON CITY, MO—Two municipal airport bond issues in the State of Missouri have been rendered invalid by a decision of the Missouri Supreme Court The ruling, however, adds weight to the existing body of findings concerning the validity of municipal bonds when issued for the acquisition, construction, and maintenance of airports, according to the Aeronautical Chamber of Commerce

The bond issue in question, a $2,000,000 authorization voted by the citizens of St Louis was declared invalid, the decision being based on a technical point rather than the purpose of issue By the same decision a $1,000 000 issue voted by Kansas City becomes invalid The court held that the cities had erred in not providing a special registration of voters for the bond election but has granted a rehearing of the case New briefs will be filed If the decision is not reversed new elections will be called by the two cities

Concerning the validity of the bonds, the court's opinion, written by Judge W. T. Ragland, declared in part

"The question . . . is obviously a new one The courts which have had occasion to consider it have, however, answered in the affirmative, and no court of last resort so far as we are advised, has ever held to the contrary Not only that, but the function involved is given tacit recognition in numerous statutory enactments, both state and Federal We have no doubt of the soundness of the view which obtains

Judge Draws Parallel

"An airport with its beacons, landing fields, runways, and hangars is analogous to a harbor, with its lights wharves and docks The one is the landing place and haven of the ships that navigate the water, the other those that navigate the air . . . If the ownership and maintenance of one fall within the scope of municipal government, it would seem that the other must necessarily do so"

Rochester Included In Universal Routing

MINNEAPOLIS, MINN—Re routing of the Universal Air Lines passenger service between the Twin Cities and Chicago in order to include the city of Rochester, Minn., home of the famous Mayo clinic has been announced by officials of the company here The flying schedule was also changed

Under the new schedule, planes leave Minneapolis at noon, and St Paul 10 min later They arrive at Rochester at 12 50 P M. and at Chicago at 3 30 P M The return trip leaves Chicago at 9 A M. arriving at Rochester at 11 40, St. Paul at 12 20 P M and Minneapolis at 12 30 P M The change was made in order to accommodate the number of persons who visit Rochester from the East No change was made in the flying schedule between Chicago and Cleveland

Galesburg Dedicates Airport

GALESBURG, ILL.—The new 80 acre municipal airport was formally dedicated here recently with a squadron of eight planes from Chanute Field Rantoul Ill, participating in the ceremonies A group of local business men sponsored and are financing the port until the municipality takes over the field Present plans call for the addition of 50 acres to the tract

Baltimore Beacons Lighted

BALTIMORE, MD—Two airplane beacons were initially turned on November 15 One of 2,000 000 candlepower is visible for 30 mi, the other, of 1 000 000 candlepower, points directly toward Logan Field The Standard Oil Co of New Jersey donated the lights

Vote to Improve Omaha Field

OMAHA, NEB—Omaha's municipal airport is to be improved at a cost of $250 000 The project, which provides for the issuance of $50 000 worth of bonds annually for five years, was at first reported defeated by 42 votes at the recent election but the ballots cast by absentee voters saved it Plans for improvements are already under way The city will retain control of the field, according to Commissioner Dean Noyes in charge.

Robertson Opens New Air Service

New Kansas City-St. Louis Line Connects With Service to Chicago

ST LOUIS, MO—Air passenger service between St. Louis and Kansas City, Mo. was inaugurated November 15 by the Robertson Aircraft Corp unit of the Universal Air Lines System The service connects with that between this city and Chicago, which has been revised to enable a seven hour schedule between Chicago and Kansas City and service furthermore, has been placed on a seven rather than six day schedule

The new air line is a link of the transcontinental train-plane service being formed by the Universal Air Lines, a recently organized $7,000,000 concern The completed coast to coast air line is expected to be in operation the early part of 1929

Four place Ryan Brougham airplanes equipped with landing lights, Whirlwind engines, and having a cruising speed of 90 m.p.h., are temporarily being used on the Kansas City St Louis service The Ford planes having a capacity of 12 passengers are continuing in service between here and Chicago

To Use Four Fokkers

Four 12 passenger Fokker planes will be put in operation by the Robertson Aircraft Corp in Spring when service between Kansas City and Columbus, O., via St Louis will be opened Passengers leaving Kansas City by plane in the morning will arrive at Columbus the same afternoon in time to board fast trains for the East Connections will be made with the Western Air Express at Kansas City on the westbound trip where Fokker planes will run to Los Angeles The Fokker planes will be equipped with Wasp engines, riding chairs radio in each plane buffet lavatory with running hot and cold water ash trays and cabin boys

The new airline also makes connections at Chicago with the Universal service between Chicago and Cleveland Passengers leaving Kansas City in the morning may be in Cleveland at 7 45 that night by making connections with the plane leaving Chicago at 4 00 P M daily for Cleveland Planes leave Cleveland at 6 50 A M, arriving Chicago at 8 35 A. M

Schedule Announced

The schedule for the Kansas City-St Louis air service is as follows Planes leave Kansas City Municipal Airport at 8 30 A M, arrive here at 11 10 A M, changing to the tri-engined plane passengers leave St Louis at 12 30 P M and arrive at Chicago three hours later On the westbound trip, planes leave Chicago daily at 9 A. M and arrive here at 12 15 P M Departure for Kansas City is at 2 15 P M, with arrival at 5 P. M.

The fare on the Kansas City St Louis air route is the same as on the Chicago run, $30 one way $55 round trip From Kansas City to Chicago, the fare is $55 one way or $105 round trip The distance between Kansas City and St. Louis is approximately 226 mi

Business men who make a round trip via plane between Kansas City and St Louis save 9 hr 20 min If they go via air between Kansas City and Cleveland then transfer to train for New York, they will save 16 hr 45 min on the round trip basis On the round trip flight between St Louis and New York, 9 hr 5 min. can be saved, between Kansas City and Chicago, 8 hr, 20 min., between Dallas and Chicago 5 hr 20 min and between St. Louis and Chicago, 6 hr, 45 min, according to estimates

Air Safety Law For Sioux City

SIOUX CITY, IA.—The city council has adopted its first air safety ordinance intended to protect both fliers and residents of the city. Prohibition of stunt flying, dropping of handbills and other articles, except over designated sections of the city, and operation of planes by inexperienced or unlicensed pilots, particularly passenger carrying planes, are principal features of the ruling All flights above the city must be made at a minimum of 2,000 ft

Service Inaugurated On Wichita-Tulsa Line

WICHITA KAN—An air passenger line from Wichita to Tulsa was started on November 15 by the Air Transportation Co of Wichita Newspapermen were the first passengers Two round trips are made daily, one in the morning and the other in the afternoon The air journey takes 1 hr., 15 min

A six passenger Travel Air monoplane and a Laird cabin biplane are in service now and if business warrants another Travel Air will be used When the service opened between the two cities more than 150 passages had been reserved. I M McConaughey piloted the first plane out of Wichita N L Sifers is manager of the concern

Daily Service for Coast Line

WASHINGTON D C—Additional service will be offered over the Seattle Los Angeles air mail route beginning December 1 according to Acting Postmaster General Glover This route will thereafter be operated on a daily rather than 'daily except Monday' schedule as at present

Activity Reported At Hoosier Field

Indianapolis Records 90,000 Mi. of Flying Without Serious Accident

INDIANAPOLIS IND—Hoosier Airport in a recent report to the Department of Commerce covering a six-month period, states that its pilots flew more than 900 hr, a total of 6 743 flights or 90,000 mi, carried 7,420 passengers and trained 33 students—all without a serious accident The four pilots are Bob Shank, airport president, whose total time is now 3 500 hr Harold C Brooks secretary-treasurer, 3 300 hr, Capt. Earl W Sweeney instructor 3,000 hr, and Orville L. Grimes, 1 800 hr

The Hoosier Airport located northwest of the city at Kessler Boulevard and Lafayette Road was started about a year ago by Bob Shank and Harold Brooks who have been pilots since 1914 and 1916, respectively Shank was one of the first three pilots in the air mail service when the New York Washington line was first established before coming here he operated a field at Huntington, W Va.

Housing for 16 Planes

Hoosier field has two hangars accommodating 16 planes an office building, with pilot quarters, and a repair shop Plane equipment consists of six OX-5 Travel Air biplanes for passenger carrying, a new Travel Air cabin monoplane equipped with a Whirlwind, also three student training planes and two reserve planes Hoosier is distributor for Travel Air in Indiana, Kentucky, and a part of Illinois and West Virginia and has sold 26 biplanes in the six month period covered in the above mentioned report

Flint and Pontiac Get Service

WASHINGTON, D C—Flint and Pontiac Mich., will be embraced in the air mail system beginning December 1, according to W Irving Glover, Acting Post master General Pontiac will be included by an extension of the route from Detroit, making Pontiac the terminal of the line, which at present runs from Chicago to Detroit via South Bend, Ind, Kalamazoo, Battle Creek, Jackson, and Ann Arbor Mich Flint will be included on the northern leg of the Michigan system by a diversion between Lansing and Saganaw

Record Day at Newark

NEWARK, N J—Approximately 500 persons were taken for airplane rides at the Newark airport here Sunday, November 18, in the biggest day the municipal field has had since it was opened October 1

Ann Arbor Develops New Municipal Field

ANN ARBOR MICH—The newly dedicated municipal airport here promises to become one of the finest fields in the state Located on the State Street Road three miles south of the old stadium, the tract includes 115 acres of smooth turfed naturally drained land which has been cleared of obstructions

An all steel hangar with a concrete floor has been erected to store visiting planes as well as those owned locally Runways 300 ft wide and 2 500 ft long extending northwest and southwest have been laid out and conditioned The ground in front of the hangar and leading from the runways will be graveled

Boundary lights, a ceiling projector and a beacon are expected to be installed as rapidly as plans can be completed in preparation for night flying Since July 15 Ann Arbor has enjoyed air mail service

Pitcairn Line to Miami Will Open December 1

WASHINGTON D C—Air mail service between Atlanta Ga. and Miami, Fla via Jacksonville Fla becomes effective December 1 according to an announcement by the Post Office Department which has contracted with Pitcairn Aviation Inc to carry the mail. The schedule follows

Southbound—Leave Atlanta 6 45 A.M. leave Jacksonville, 9 55 A M, arrive Miami, 1 30 P M Northbound—Leave Miami 11 05 A M, leave Jacksonville, 2 50 P M arrive Atlanta, 5 50 P M

The schedule affords connection with the New York Atlanta air mail service, as well the transcontinental route

Mast Hazard at Lunken

CINCINNATI, O—Fliers visiting Lunken Airport are warned of an 80 ft mast erected in the northwest corner of the field This mast will be lighted at night and in "thick" weather It is erected for use in unloading railroad cars which will bring supplies for building the levee to protect the new municipal airport.

Kansas City Issues Booklet

KANSAS CITY MO—Through Robert M Burtt, aeronautical activities director, the Kansas City Chamber of Commerce is issuing a booklet entitled "America's Most Convenient Airport," therein describing the new municipal field and Kansas City as an aviation center

Ft. Wayne Beacon Installed

FT WAYNE IND—A beacon of 8 500 000 candlepower has been installed on the 81 ft tower at the Paul Baer Municipal Airport

Radio Tried on Universal Plane

MINNEAPOLIS, MINN—Radio equipment for receiving hourly weather reports en route has been installed on a plane of the Universal Air Lines system, flying between this city and Chicago The experiment will be studied closely, for company officials feel such equipment will be essential for use on the New York-Chicago service planned by the firm Reports will be especially needed during the crossing of the Appalachian Mountain district.

Records Made Over Airways in Mid-West

CHICAGO, ILL—Eddie Muldgh es tablished a westbound record for mail planes between Chicago and Minneapolis when he covered the route in one of the Northwest Airways planes with five passengers aboard, mail, and pictures of the ill fated liner *Vestris* in 2 hr. 42 min—a saving in time over the regular schedule of 1 hr 28 min

Breaking all previous company records a Stout Air Service Ford passenger plane recently flew from Chicago to Detroit a distance of approximately 250 mi in 1 hr, 48 min—40 min less than the best previous time The craft which carried nine passengers was aided in its flight by strong tail winds

Prepare 12 Airway Bulletins

WASHINGTON D C—Twelve new Airways Bulletins recently compiled and now in the process of publication will soon be available on request. They are 455 Barstow, Calif 456 Pratt, Kan. 457 Hutchison, Kan 458 South Bend, Ind 459 Ottawa, Kan 460 Gary, Ind 461 Silverton, Ore 462 Wichita Falls, Tex 463 Lakehurst, N J 464 Waynesburg, Pa 465 Rockwell City, Ia 466 Olivet, Kan

Plane Service at Granby

SPRINGFIELD MASS—M 1 Ayres of this city on April 15 will inaugurate an aviation school and commercial service at a new flying field at Granby Mass A hangar with accommodations for six planes is reported to be nearing completion.

Santa Monica Lets Contract

SANTA MONICA CALIF—Contract has been let to A D Fyschall 1661 Forest Avenue for construction of two airplane hangars at Clover Municipal Field Each structure will be 100 by 135 ft.

Oakland Airport Being Improved

Officials Expending Approximately $250,000 in Development of Field

OAKLAND CALIF—Looking forward to a great aviation year in 1929 Oakland Municipal Airport officials are preparing for the anticipated business increases by expending approximately $250 000 for additional flying field improvements and facilities

At the Oakland airport one of the largest non military hangars in the United States is now nearing completion This structure, which measures 120 ft by 300 ft will cost $90 000 In addition to the 36,000 sq ft of storage space available in this hangar a 20 ft lean to, which runs the full length of the building provides for shops and offices With the completion of this hangar 36 000 sq ft of space will be available at Oakland airport for the storing of planes

At the present time all of the hangars are full and about a dozen planes are staked outside the hangars The airport clerk s report for November 9 revealed that 82 planes were at the field

Plans and specifications for a fifth hangar have been adopted by the Board of Port Commissioners This hangar will be the same size as hangar No 3 120 ft by 200 ft and will cost approximately $75 000

Channel to Quicken Service

Another important airport project the dredging of a channel from the deep waters of San Leandro bay direct to the hangars now is nearing completion This channel will cost approximately $100 000 It will be 300 ft wide and 15 ft deep and will provide for speed boat communication between the Oakland airport and San Francisco bay cities This channel reduces the distance between the Oakland airport post office and the San Francisco ferry post office to 11.2 mi As all of the air mail for the San Francisco bay region is received at and dispatched from Oakland airport the value of this channel is plainly apparent. It also serves the several thousand acres of industrial lands adjacent to the municipal airport

The extension of the airport drainage system, now under way, is to cost approximately $15 000 and the installation of a paved roadway, sidewalks and gutters along the north side of the field, from the high way to the channel landing will cost in the neighborhood of $50 000

Vote $25,000 for Field

ALBANY ORE—By a three to one vote, residents of this city have approved a $25 000 bond issue for a municipal airport Several sites are available, but a selection is yet to be made

FOREIGN ACTIVITIES

Perth-Sydney Route Schedule Announced

PERTH, AUSTRALIA — Travellers will be able to leave Perth on Tuesday arrive in Sydney on Friday, and start back to Perth the following Monday the return trip occupying just under one week, with the inception of the Perth-Adelaide service in April, 1929 it is announced here.

Arrangements for the opening of the service are well advanced and great interest is being displayed by the business community and the travelling public numerous inquiries having been received for advance bookings in each direction while many business houses are daily requesting information regarding the aerial mail

The erection of necessary buildings along the route will be commenced within the next few weeks, including hangars 120 ft. square at Perth, Forrest, and Adelaide Rest Houses for passengers and staff at Kalgoorlie, Ceduna, and Adelaide, and a hotel at Forrest, which will be the overnight stopping place. The latter building has been designed to afford the maximum comfort and will provide excellent accommodation for 18 passengers in addition to staff

Blackburn Moving to Hull

HULL, ENGLAND—Transfer of the main factory of The Blackburn Airplane Co from Leeds to Brough, near Hull is announced by officers of the company, who explain that the rail and continental sea connections of Hull, as well as the proximity of the smooth waters of the Humber River for the use of seaplanes, were reasons for the change. The transfer is expected to be completed during the coming 12 months, and will require an expenditure of approximately $75 000

Form Finnish Company

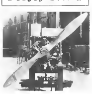
HELSINGFORS, FINLAND—With the formation of a corporation called the Osakeyhtio Sasko, Finland is to have a company that will manufacture, sell and service airplanes and parts, and arrange to give aero instruction.

The company has been capitalized at 250 000 marks ($6,250), but its charter allows for an increase in capitalization to 750 000 marks ($18,750)

Open British Columbia Fie'd

QUESNEL, BRITISH COLUMBIA—The "Northern Light," a seaplane owned by Yukon Airways, Ltd., recently landed at Johnson's Field here, officially opening that airport. The tract is situated on the south bank of the Quesnel River

Pobjoy Tested



The new Pobjoy engine recently tested by the British Air Ministry. This power plant develops 65hp and has an overall diameter of 25 in

Neon Beacon System Planned for England

LONDON ENGLAND—Encouraged by success of experiments with the neon beacon at Croydon Airport, the British Air Ministry is reported to be contemplating the erection of similar beacons along the chief air routes of England

Each beacon on the route will flash its own message in Morse code and by use of a code book the pilot flying through fog or darkness will be able to ascertain his exact position To prevent confusion the landing fields will be provided with more powerful beacons

Appoint Hawaiian Air Group

HONOLULU, HAWAII—Lieut Col. John H Howard, U S A, chief of the Air Service Hawaiian Department, Comdr. Victor D Herbster, U S N commanding officer of the Naval Air Station at Pearl Harbor, and A W Van Valkenburg of Honolulu have been appointed to the aviation committee of the Chamber of Commerce of Hawaii Commander Herbster and Lieut Chester Clark U S A, Air Corps (Reserve), were named a few days previously as members of the Territorial Aeronautical Commission by Gov. Wallace R Farrington

Plans Flight to Seville

BUENOS AIRES, ARGENTINE—A one-stop flight from Buenos Aires to Seville will be attempted by Caludio Mejia, Argentine aviator, if his plans are approved by the Government The intermediate stop is at Natal Enrique Debenedeti is financing the flight

Announce Resumption Of Canadian Service

VICTORIA, BRITISH COLUMBIA—Resumption of the regular service between Vancouver Victoria, and Seattle, as well as expansion in the form of a new service between Vancouver, Nanaimo, and Victoria, is announced by Cecil Eve, manager of the B C. Airways Limited, Victoria

According to Mr Eve, the directors of the B C. Airways Limited have decided to purchase a Ford plane and two eight-passenger seaplanes The Ford will be used on the Victoria-Vancouver Seattle triangular route, while the two seaplanes will be graduated on the new service between Victoria and Nanaimo, on the Island, and the city of Vancouver, on the mainland. Both services will be in active operation by the end of January, 1929

German Tests Plane Of Ornithopter Type

BERLIN, GERMANY—An ornithopter type of aircraft described as part plane and part glider is reported to have been constructed at Aschaffenburg by August Schmitter, plane builder, in cooperation with the Bavarian Airplane Co

It is said that satisfactory early trial tests have already been made with the craft which, according to a description in the *Deutsche Allgemaine Zeitung*, does without the horizontal rudder, elevator, and stabilizer but has a fan shaped vertical fin. The duralumin fuselage is about 13 ft. long and the wing spread is about 35 ft

Schmitter is also said to be completing a light plane designed to sell for less than $1,000

Canadian Licenses Increase

OTTAWA, CANADA — Tabulations comparing the number of civil aviation certificates and licenses in effect March 31 and August 31 of the present year indicate the advance of aviation in Canada Private licenses increased from 12 to 37 during this period, commercial licenses from 63 to 152, air engineers 128 to 172 registeced aircraft 70 to 202, and airports from 25 to 43

Plan New Spanish Line

ROME, ITALY—Air service between this city and Barcelona, Spain, is now contemplated, experimental flights having already been made over the route, according to De Forest Spencer, assistant trade commissioner here The line would be operated by the Societa Anonima di Navigazione Aerea di Genova

THE BUYER'S LOG BOOK

Temperature Gauges

IN ORDER that the pilot may be warned of sudden changes in weather conditions, a device to record the temperature of the air through which a plane is flying is highly desirable Such an instrument has been developed by the Moto Meter Co, 220 West 42nd St, New York City The device was first designed for the Collyer and Mears globe encircling flight Each of the planes of the Byrd expedition is equipped with one of them

The special Model C Moto Meter air temperature indicator consists of a dial placed on the instrument board

The Special Model C Moto Meter air (left) and oil (right) temperature indicators

and a flexible connection to the bulb which is exposed on the leading edge of the wing The dial is white with black figures and is graduated from — 40 deg to + 212 deg F. The Model C oil temperature indicator is similar in construction and has a black dial with white letters It is graduated from + 32 deg to + 212 deg F

Samson Sash Cord

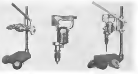
INCLUDED IN the products of the Samson Cordage Works, 88 Broad St, Boston, Mass, is a complete line of sash cord Samson "Spot" sash cord is made in six sizes numbered from 6 to 12 and is furnished in 100 foot hanks (usually three connected), one dozen hanks in a package or in reels, coils or tubes It is also sold in 25 foot hanks The sizes range from 3/16 in to ¾ in Larger sizes are made on special machines which increase the size of the cord by increasing the number of strands rather than using larger strands

For heavier windows the use of Samson wire center sash cord is recommended by the company. This consists of a special quality steel wire cable with a braided cotton cover This cord is made in two sizes, No 8 and No 10, and is furnished in 100 foot hanks, one dozen hanks per package, or in coils of any desired length All Samson sash cord is marked with a succession of spots of a color different from that of the cord Cordage products to meet special requirements also can be furnished

General-Purpose Tool

DRILLING, GRINDING and buffing work can be done with the General-Purpose tool developed by the Wodack Electric Tool Corp, 4627-4629 West Huron St, Chicago, Ill. This device is a ⅜ in portable electric drill which also can be used for the other operations.

The General Purpose tool weighs but 7½ lb. and is equipped with a General Electric Universal motor of the



Three views of the Wodack General Purpose tool and stand showing use as grinder (left) or drill (center and right)

variable speed type controlled by a large trigger switch. The tool can be furnished with a stand to hold it vertically for drilling and horizontally for grinding and buffing.

Tools for reaming, cleaning, polishing, screw driving, sawing, routing, grooving and other industrial purposes also are made by the company.

Waltham Airplane Clocks

INCLUDED IN the line of clocks manufactured by the Waltham Watch Co, Waltham, Mass, is a model specially designed for aircraft use This type, which is designated Model XA, is constructed to keep accurate time under severe conditions of vibration and exposure and under other conditions to which airplanes are subjected

The Model XA Clock

The Model XA is an eight day clock with black dial and white letters Each clock of this type is subjected to the full Government test required of instruments of this type The same clock is also built into the Model XX which is not subjected to these rigid tests and is lower in price A model XA clock was installed in the Ryan monoplane "Spirit of St. Louis" for Lindbergh's transatlantic flight All clocks are built to high standards and the company has been engaged in the manufacture of time pieces for a number of years The model XA clock is used by the U S Army Signal Corps and Air Service, the U S Navy Air Service, the American Bell Telephone Co and others.

The Military Value of Airships

(*Continued from page 1621*)

ft. an airship ascends, it can carry 1-30 of its displacement, less the load. Assume the airship to be of 70 tons displacement, with a useful load of 35 tons. At 10,000 ft., the useful load would be reduced to 12 tons (without allowing for temperature corrections, and so forth, which permit of greater heights being reached with this load). If it was only intended to carry 12 tons, it was of no advantage to make the hull strong enough to carry 35, and so this was not done. In the R 38 and the "Dixmude," maximum loads were carried.

The "Shenandoah" broke, because it was driven fast into bumpy weather—it had to be driven fast to make the rudders and elevators effective. Had this airship been fitted with swivelling propellers, capable of driving it directly up or down at will it would not have been necessary to drive it as fast, and the ballast and gas would not

A DH53 light plane "housed" close up under the hull of the dirigible R-33. This plane was used in tests conducted by the British government to determine the practicability of launching and recovering heavier than air craft from rigid airships while in flight

have been lost. Remedy: Revert to the pre-war practice of using swivelling propellers, and see that hull strengths are made adequate. That this is possible, is proved by the "Los Angeles," which carries a full load at high speed.

(4) Airships have been lost owing to unexpected high winds. The only example of this is the raid of German airships on England, when they met an unexpectedly high north wind. One was blown into the Mediterranean, two came down in France and the rest got home. Cause: The airships had stopped some of their engines when over England. These engines got so cold, and the crews were so exhausted after a long spell at 15,000 ft., that they could not start the engines. The crews that did manage to start all their engines got home safely. Remedy: A little hydrogen drawn from the gas bags makes any engine easy to start in any temperature. Apparatus for this purpose has been designed and fitted, and it works efficiently.

If it be granted that we can now obtain airships of the rigid and semi-rigid types, with their previous defects eliminated as indicated above, of what use can they be in war?

Let us consider an airship of the R 101 class, with a

displacement of 150 tons, useful lift of 75 tons, and with engines of 4,000 hp, giving it a full speed of 70 knots.

If we wish to employ it for reconnaissance purposes, the performance will work out much as follows:

Crew	3 tons
Food and drinking water	1 ton
Ballast	15 tons
Armament	6 tons
Fuel and oil	50 tons
	75 tons

The airship will consume some 4 lb of fuel per horsepower per hour, so that at—

Full power (4,000 hp) the ship can fly for 70 hr. at 70 knots = 4,900 mi

¾ power (3,000 hp) the ship can fly for 93 hr. at 60 knots = 5,580 mi

½ power (2,000 hp) the ship can fly for 140 hr. at 49 knots = 6,860 mi

¼ power (1,000 hp) the ship can fly for 280 hr. at 35 knots = 9,800 mi

⅛ power (500 hp) the ship can fly for 560 hr. at 24 knots = 13,440 mi

It will be noted that six tons has been reserved for armament. This should allow an ample number of machine guns being carried, above and below the ship, to give any planes, approaching close enough to carry out a bomb attack, a very warm time.

Seeing that from a height of 6,000 ft it is possible to see for 96 mi, there is no craft in the world so suitable for strategical reconnaissance as the large airship, which is capable of accompanying a fleet proceeding to any part of the world.

Airships As Plane Carriers

Seagoing aircraft carriers, as we know them today, are considered by some as very unsatisfactory craft. They are very expensive. It is necessary to head them into the wind to despatch or receive aeroplanes, thereby delaying the fleet they are attached to or becoming detached from it. An airship, such as we are considering, would still have an ample radius of action if its fuel supply was reduced to 25 tons, allowing a dozen aeroplanes to be carried. This is undoubtedly the best method of transporting planes from place to place in peace or war. It is also possible to release planes from an airship, and for them to fly back, but not in the numbers it is often supposed. An airship of 150 tons should be able to maintain a steady height, when flying fast, if six tons heavy or light. Thus, supposing we are carrying nine two-ton planes, the airship is flying at 5000 ft and is six tons heavy. When we have released three planes it will be in equilibrium, and when we release the next three it will become six tons light. Should we despatch another group of three planes, it would be impossible to keep the airship down. It would rise until she had blown off gas equivalent to six tons.

When our planes return, the first three would put the airship in equilibrium again, the second three would make it six tons heavy, and it could just maintain its height. The third set of three would make it six tons heavy, and bring it down, unless the airship carried sufficient ballast to counteract this, which it would do on the 25 tons we have allowed for planes and their equipment.

The limit of this class of airship used as aeroplane carriers is, therefore, likely to be twelve machines for transport purposes and nine for active employment. It should be easily possible to construct three such airships for $5,000,000, so that for the cost of one seagoing aircraft carrier, we get 21 airships capable of carrying 189

aeroplanes for fleet work, or of transporting 252 which is quite a useful performance

There are strong advocates of fixed aerodromes around the British coasts, each a base for defending aeroplanes This is a reversion to the time when torpedo boats were stationed in a similar manner It used to be considered that they could make waters within their radius of action unsafe for battleships So they could, if battleships chose to enter such areas at times, and in weather suitable for torpedo craft However, they could go into any waters, when they chose, with their own concentrated small craft, and "mop up" the individual torpedo bases one by one Airships carrying planes can do the same thing to aerodromes The airship need never come inside the radius of action of shore based aeroplanes until the chosen moment, while the defence must be on the alert all the time, wearing out its aircraft on futile patrols It is submitted that the airship as aeroplane carrier has a great future before it.

The Radio Controlled Air Torpedo

In the late War the airship had no weapon it could use against surface craft other than bombs and machine guns. Both were ineffective The air torpedo, controlled by wireless, has now been partially developed There is no doubt, that in a year or two, it will be perfected This is simply a small aeroplane—inherently stable—without an engine, and controlled by wireless It can be brought down close to the surface of the water, and can fly for a mile or more at a height of about 20 ft until it strikes the side of a ship, or is put down in the water by W/T control, when it functions like a depth charge

In an ordinary Whitehead torpedo, weighing 1 ton, one-quarter of this weight is explosive charge. In the air torpedo of the same weight, the explosive charge is three-quarters of a ton

From a height of 10,000 ft , the range of such a torpedo is 16 mi , so that an airship armed with six of these weapons would be justified in engaging ships armed with the heaviest guns, especially if the attack could be made from above protecting clouds It is, of course, possible to fit an engine in these torpedoes, giving an indefinitely increased range, at some sacrifice of explosive charge, and the loss of that complete silence that characterizes the glider

Directional and Height Control Possible

It is feasible to control such air torpedoes from two points—one for direction, and the other for height When this is done, very accurate shooting should be possible. This method of attack can also be used against defended areas, and when kite balloon curtains are employed.

Airships also can carry quite a number of mines—nothing, of course, compared to a surface or submarine minelayer, but the airship has the power of putting mines in places unattainable by other means For instance, in the late War it was proposed to lay some shallow water mines in the area of Kiel used by the German fleet for exercise purposes The minelaying gear operated satisfactorily, but we had no airship, at the time, large enough to reach the area without infringing upon Danish neutrality The operation was not approved for this reason But there can be little doubt that airships will be used for this purpose in the future

The smaller airship is always the most suitable type of craft for providing escorts for convoys in submarine waters owing to its ability to keep station on the convoy

It is less suitable than the aeroplane for surprise attacks on submarines on the surface, owing to the fact that it is easier to see. Since the War, we have been informed that the German submarines knew our airship patrols well, and had the numbers of all the airships operating from East Coast bases, but never ventured to attack when any airships were out. The use of the hydrophone from airships was receiving particular attention at the end of the war. Airships are especially suited craft from which to operate it, owing to the absence of water noises.

The co-operation of airships and submarines offers great scope for future work. We have had an airship towed by a submerged submarine with the captains of the two

The U. S. S. "Los Angeles" at the Naval Air Station, Lakehurst, N. J. Note the mooring mast at the right in the picture

ships in telephonic communication. The submarine could slip the airship, when she had the information she required, and carry on with her work as necessary.

When we come to consider work in conjunction with the Army, large airships can, of course, convey troops and military material, and are particularly suitable for ambulance work.

Probably the smaller type of airship should replace the kite balloon. It requires no more men to handle it, can be inflated in the same way, will bag down just as a kite balloon does, and can remain stationary over any required spot.

It has the advantage that there is no winch, whose position is evident and open to attack. Its base can be further to the rear, and the airship can be used for messenger work at night, while its cost is no greater.

Had we not copied the German practice, and found a model of their balloon in Belgium, it is probable that the small airship would have been developed for this purpose the late war. The "Beta" actually did do a little of this sort of work in 1914. An improved "Beta" with modern engines would be of great use for all work where kite balloons are now employed.

There is a use, too, for airships in savage warfare. At present aeroplanes appear, drop their bombs and pass along. The inhabitants emerge from their holes and carry on with their daily avocations. The effect of aeroplanes on the Moors, when employed in quantities by the French and Spaniards, was very small, and our experience on the N. W. frontier of India is the same. An airship on a similar mission would stay with the local inhabitants day and night, and would be much more troublesome than the passing visits of aeroplanes.

The difficulties recently experienced in Iraq in supplying columns of troops with munitions, owing to the

ground being unsuitable for landing, would have disappeared, had airships been employed as cargo carrying craft and for evacuating the sick

It is hoped that it has been possible to show that there is some future for the airship from a military point of view, and that economy and efficiency can be attained.

The Cirrus Mark III

(*Continued from page* 1620)

white metal bearings On the back of the cap, a dowel is provided, cast integral with the bearing, which registers into a recess in the cap and prevents the bearing from turning As an alternative, phosphor bronze white metal lined big end bearings can be supplied

The four-throw crankshaft is of solid construction, and an extension forming the propeller shaft is secured to the forward end by means of a keyed cone hub and bolts The complete shaft rotates in five bearings Three of these are the die cast white-metal center bearings, and the other two are the roller bearings at each end The caps for the roller bearings and center bearings are carried by the upper half-crankcase, and are secured by studs and nuts The caps are steel and of rugged construction

The crankcase is an aluminum alloy casting, divided along the center line of the crankshaft The upper portion is stiffened by three transverse webs, which also form the housings for the center bearings Housings likewise are provided in the upper portion for carrying the camshaft bearings and the upper oil pump spindle bearings Provision is made also for securing four bearer or supporting feet Housings for the ball bearings carrying the timing gears are provided in the upper half and timing gear cover On the front wall above the nose a small casting is secured, which acts as an oil filter, and to which breather pipes are attached

The lower half, beyond forming in itself a cap for the radial thrust bearing, merely acts as an oil sump and a cover for the moving parts The upper and lower portions are bolted together, with a brown paper gasket at the joint

Single Camshaft Operates Valves

All the valves are operated by a single camshaft It is supported in four bearings, the rear being a large ball bearing and the remainder phosphor bronze The shaft is driven off the end of the crankshaft through the medium of steel gears supported, as already mentioned, between ball bearings housed in the top portion of crankcase and timing gear cover

The induction manifold is of steel, with branches to each inlet valve port A heated muff is provided in the central section, a pipe being taken from the exhaust manifold so that the exhaust gases can circulate therein The joints between the induction manifold cylinder heads, and carburetor, are made with "Hallite" gaskets

The lower half of the crankcase holds sufficient oil for about five hours' flight The oil pump is arranged at the lowest part of the base, so that it is always flooded, or self-primed with oil This pump, which is a gear type, forces the oil through a gauze filter, which is arranged horizontally just above the pump, thence through the main delivery pipe to the oil gallery arranged on the port side of the engine. The oil gallery is connected to passages cast in the top half of the crankcase, which runs to the center and intermediate bearings, the oil is thus forced under pressure direct to each bearing

(*Continued at top of page* 1642)

The spark plugs in each cylinder are placed at opposite sides of the combustion chamber Two British Thomson-Houston high tension magnetos are normally used, but these will be replaced by Scintilla magnetos in the Cirrus engines made in this country The Claudel Hobson carburetor also will be replaced by one of American manufacture

The main advantages of the engine are its simplicity and reliability, and the fact that it can be mounted in the nose of a plane with a minimum of head resistance and obstruction to view The engine is said to have another

DeHavilland "Moth" powered with a Cirrus engine.

advantage in that it requires no greater skill for its maintenance than an ordinary automobile engine

The American Cirrus company does not intend to manufacture planes Its policy will be to co-operate with plane constructors and designers in every possible way, particularly as regards installation problems

The specifications of the Cirrus Mark III engine are as follows:

Type	Four cylinder-in-line, vertical
Number of cylinders	Four
Cooling	Air
Bore	279 in
Stroke	33 in.
Displacement	81 cu. in.
Compression ratio	54 to 1
Normal b hp	85 at 1,900 r p m
Maximum b hp	95 at 2,100 r p m
Weight dry	280 lb
Fuel consumption	54 lb per b hp hr.
Oil consumption	0213 lb per b hp hr.
Direction of rotation	Clockwise
Ignition	Two magnetos
Tachometer	½ engine speed
Length overall	29 5 in.
Height overall	23 3 in.
Width overall	12 25 in.
Bearer centers	13 75 in.

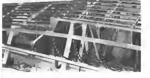
Use of Monel Metal and Nickel in Aircraft

(*Continued from page 1619*)

reducing side is used, and the borax-boric flux The metal of a welded joint is not so strong as the unfused metal, if the weld is ground down smooth with the sheet If not ground down, equal strength can be relied upon The practice for carbon-arc welding of monel metal and nickel is exactly the same as for steel, but this type of welding is not generally recommended Monel metal and nickel can be successfully spot-welded on any of the spot-welding machines on the market. With some experience brittle welds and burning are obviated It requires about

one-half the time and twice the current to spot-weld them as compared with steel of the same thickness Automatic seam-welding with the machines on the market designed to make a continuous spot-weld is successfully used with monel metal and nickel A special flux has been developed for use in arc welding

Ordinary methods are used in soldering monel metal and nickel Where a soldering seam will be strong enough for intended service, this method of seaming is recommended as the most convenient Strong lap-seams can be made by soldering, zinc chloride hydrochloric acid flux and various paste fluxes work well Surfaces to be



A step of the bottom of one of the Navy's monel metal seaplane floats This photograph was taken while the pontoon was in the course of construction The stringers and frames are shown clearly

joined must be thoroughly cleaned by polishing with fine abrasive, followed by washing or in some cases by acid cleaning Stronger bonds are obtained with silver solder, brazing solder, or nickel silver than with soft solder Such joints are strongly recommended where the high soldering temperature is not a drawback Monel metal and nickel construction may well be joined by riveting, preferably in the cold

Steel and monel metal are quite similar in drawing and deforming capacity, the degree in which monel metal can be deformed without fracture, depending of course on the initial temper Soft temper is best for operations requiring reduction in sections but harder tempers can be used where the work is confined to bending Extreme cold working requires intermediate annealing

Monel metal and nickel may be machined without difficulty, cold-worked metal more easily than soft metal Generous lubrication is generally essential Tools should be ground with a sharp cutting angle—considerable hook or rake Production should be about two-thirds that of machinery steel for the same piece Monel metal and nickel are both of good forging character Forgings carry mechanical properties on the order of those for hot-rolled metal, sometimes better Castings in monel metal and nickel are turned out by various foundries throughout the country Consistently sound metal is normally to be expected The main deficiency in cast metals in general lies in their relatively low mechanical properties The following values apply to cast monel

Tensile str	65-75,000 psi
Yield point	30-40,000 psi
Elong in 2"	25 35%

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SIDE SLIPS

By Robert R. Osborn

Mr. H. F. P. reports the design of a new plane which according to the literature issued concerning it, "will have specially built floats and a retractable landing *fear*." His comment that such a plane should be ideal for use in a student training school agrees exactly with our thoughts on the subject.

* * *

A newspaper item bearing the headline, "Matador With Lindbergh," states that the Colonel has been doing a little touring and sight-seeing in Mexico City with one of the most famous and popular matadors. We can imagine the enthusiastic Mexican crowds shouting, "What's the matador with Lindbergh?" He's all right.

Yes, that's pretty sad, we'll admit, but you know we don't indulge in humor like that very often.

* * *

All sea captains seem to have as their one ultimate goal and ambition a desire to buy a small farm somewhere and settle down. A parallel complex, which seems to have developed in the minds of our airplane pilots, is a desire to be the first in the history of the world to carry some sort of a stove on an aerial journey. Why stoves should have been selected instead of kittens or gum boots we can't say, but the following item, sent in by N. V. C. of Garden City, N. Y., shows that the boys are still "carrying on" with the stoves.

"Colonel Lindbergh's former aide, Lieut. Robert W. Douglass, Jr., is one of the first fliers to take a cook stove with him on an aerial journey."

* * *

OUR HANGAR FLYING DEPARTMENT

We have just heard an interesting story about the early flying days of a friend of ours which we think is worth telling. Our friend has now retired to the contracting business, and we shall refer to him only as "Bud," so that none of his customers who might read this will question his ability to "solo" the heating plants he now installs. Bud was an Annapolis graduate and was getting flight training with the air unit in southern waters. He was flying along in about the middle of his second hour of solo on an "R-6" seaplane when he saw another plane "crack up" while making a landing out in the bay. Seeing this plane sticking tail-up out in the water got Bud considerably excited so he turned and headed for the beach, wide open, to notify the crash-boat crew. He came tearing up to the beach and tried to make a "hot" landing close in, but the plane bounced out of the water and right up on the beach. The Liberty engine fell out, the lower wings were wiped off, as well as the floatation gear, while the upper wing, struts and wires draped themselves around the cockpit. The fuselage was still bouncing along the beach when Bud jumped out and ran toward the flight office shouting "Hey! Hey! There's a crack-up out in the bay."

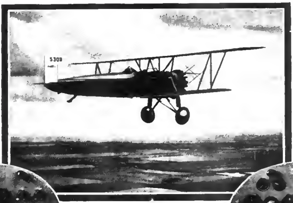
* * *

Several prominent aviation authorities are advising the college flying club boys against taking up inter-collegiate airplane racing as a sport. The Intrepid Aviator isn't very well pleased with this news as it seriously interferes with his plan to go back to his old college as aviation coach at $25,000 a year, in case he found it impossible to make a living in some other way.

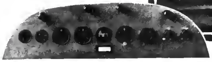
PIONEER INSTRUMENTS

ARE STANDARD EQUIPMENT ON

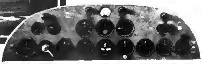
STEARMAN AIRCRAFT



A STEARMAN IN FLIGHT OVER KANSAS



PASSENGER'S INSTRUMENT BOARD



PILOT'S INSTRUMENT BOARD

THE instrument boards here shown—a good example of adequate equipment—are a Pioneer installation on R. C. Durant's Stearman.

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